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## Maryland Roadside Tree Care Expert Exam Study Guide

For Exam Domain:

### Chapter 4: Nutrition, Fertilization, and Mulching

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Trees need essential (chemical) elements to use in metabolism to be able to grow. If there are insufficient elements that the tree needs then fertilization may be a way to provide those elements.

Fertilization shall not be undertaken without establishing an objective. Why are you fertilizing the plant? To induce growth? To make up for a nutrient deficiency in the soil? Knowing why you are fertilizing will drive other decisions in the process such as fertilizer type and rate. A nutrient is an element or compound required for plant growth, reproduction or development. Nutrients are categorized as macronutrients (needed in relatively large quantities by plants) and micronutrients (needed in relatively small quantities by plants). These nutrients are listed in Table 1.

The nutrient to which plants most commonly respond is nitrogen. Nitrogen is what most fertilization prescriptions are based on. Soil and/or foliar nutrient analysis should be used to determine the need for fertilizer. Nitrogen often comes in salt form. However salts can dry out and damage plant tissues (this is where the phrase 'fertilizer burn' comes from). This is why the ANSI standards say that fertilizers with a salt index of less than 50 should be preferred.

**Table 1 – Nutrients**

Nutrient	Symbol	Type
Nitrogen	N	Macronutrient
Phosphorus	P	Macronutrient
Potassium	K	Macronutrient
Sulfur	S	Macronutrient
Calcium	Ca	Macronutrient
Magnesium	Mg	Macronutrient
Iron	Fe	Micronutrient
Manganese	Mn	Micronutrient
Zinc	Zn	Micronutrient
Copper	Cu	Micronutrient
Boron	B	Micronutrient

A fertilizer analysis is the composition expressed as a percentage by weight of nutrients in the fertilizer. A fertilizer that contains nitrogen, phosphorus and potassium is called a complete fertilizer; the three numbers listed on the packaging of a complete fertilizer stand for the percentages of nitrogen, phosphorus and potassium present. For example, a 100 lb. bag of 10-10-10 fertilizer has 10% each of N, P, and K, and so has 10 lbs. of nitrogen, 10 lbs. of phosphorus, and 10 lbs. of potassium. A 140 lb. bag of 10-10-10 fertilizer also has 10% each of N, P, and K, and so has 14 lbs. of nitrogen, 14 lbs. of phosphorus, and 14 lbs. of potassium.

Slow-release fertilizers should be applied at rates between 2 to 4 lbs. of actual nitrogen per 1,000 square feet. However, slow-release fertilizers should be applied at rates that do not exceed 6 pounds of actual nitrogen per 1,000 square feet within 12 months. This is important if you plan to fertilize more than once per year.

Quick-release fertilizers should be applied at rates between 1 and 2 pounds of actual nitrogen per 1000 square feet.

How do I calculate the amount of fertilizer needed? You need to know the following things:

- The size of the area to be fertilized. According to ANSI standards, the fertilization area is determined by the arborist, based on site considerations.
- The amount of nutrient (normally based on the amount of nitrogen or N) you want to apply per 1,000 sq. ft. of area to be fertilized. This will vary depending on whether you are using slow-release nitrogen or quick-release nitrogen as noted above.
- The fertilizer analysis for the fertilizer you intend to use (i.e., 10-10-10, 46-0-0, etc.).

EXAMPLE: If applying ammonium nitrate (16-20-0), how many lbs. of fertilizer should be applied to a 5,000 square foot area in order to apply 2 lbs. N per 1,000 square feet?

SOLUTION:

Size of area to be fertilized = 5,000 sq. ft.

Amount of N = 2 lbs. per 1,000 sq. ft. (again, this number will vary depending on whether slow-release or quick release fertilizer is used and what the soil analysis recommends).

Fertilizer analysis: 16-20-0 (16% N, or 0.16 N)

2 lbs. N per 1,000 sq. ft. = 2 lbs. N x 5 (5,000 sq. ft. area to be fertilized) = 10 lbs. N

If 10 lbs. of N are needed and the fertilizer is 16-20-0, how many lbs. of fertilizer are needed?

$100/16$  (100 divided by percentage of nitrogen in the fertilizer) = 6.26 (6.26 lbs. of 16-20-0 has 1 lb. N).

$6.26 \times 10 = 62.6$  lbs of 16-20-0 needed for 10 lbs. N

TO CHECK:  $62.6 \times 0.16 = 10$  (62.6 lbs of 16-20-0 fertilizer times 0.16, or 16%, N content equals the 10 lbs of N needed for the 5,000 square foot area).

The preferred method of fertilizer application where turf or ground covers exist is sub-surface liquid application. The advantages of this method are better distribution of fertilizer and the injection of water into the root zone. Often the factor limiting fertilizer uptake is lack of available water. However, other methods may also be used. When applying a sub-surface liquid fertilizer injection, injection sites should be 12" to 36" apart, and 4" to 8" deep.

Mulch provides organic matter to the soil around the tree as it decomposes. It also retains soil moisture, helps reduce turf and weed competition and helps keep string trimmers and mowers away from the trunk. It is important to use organic mulches. Mulch should be placed around the tree at a minimum depth of 2 inches and no deeper than 4 inches. The broader the ring of mulch, the better. Mulch that is too deep can restrict oxygen and water availability to the roots. The mulch should not touch the trunk of the tree. This can create a moist and warm environment for rot to occur. Mulch may need to be replaced every year or two.